

**Draft Interim Regional Recovery Plan for Portions of Three Evolutionarily Significant Units (ESUs) of Salmon and Steelhead—Lower Columbia River Chinook (*Oncorhynchus tshawytscha*), Columbia River Chum (*Oncorhynchus keta*), and Lower Columbia River Steelhead (*Oncorhynchus mykiss*)—within the Washington Lower Columbia Management Unit**

**National Oceanic and Atmospheric Administration's National Marine Fisheries Service  
Supplement to the Lower Columbia Salmon Recovery and Fish and Wildlife Subbasin Plan**

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**DISCLAIMER**

Under the Endangered Species Act of 1973 (ESA), the goal of a recovery plan is the conservation and survival of a threatened or endangered species. Recovery plans are prepared by the National Marine Fisheries Service (NMFS), consistent with the agency's obligations under the ESA, often with the assistance of recovery teams, contractors, state agencies, and others. Recovery plans are not regulatory or decision documents—that is, the recommendations in a recovery plan are not considered final decisions unless and until they are actually proposed for implementation. Objectives will be attained and funds expended contingent upon appropriations, priorities, and other budgetary constraints. Nothing in this Plan should be construed as a commitment or requirement that any Federal agency obligate or pay funds in contravention of the Anti-Deficiency Act, 31 U.S.C. 1341, or any other law or regulation. Recovery plans do not necessarily represent the views, official positions, or approval of any individuals or agencies, other than those of NMFS, and they represent the official positions of NMFS only after they have been approved by the NOAA Assistant Administrator for Fisheries, after giving notice of a proposed Plan and opportunity for public comment. Approved recovery plans are subject to modification as dictated by new findings, changes in species status, and the completion of recovery actions.

SUPPLEMENT

## **1 Introduction**

The National Oceanic and Atmospheric Administration's National Marine Fisheries Service (NMFS) goal is to restore endangered and threatened Pacific salmon and steelhead Evolutionarily Significant Units (ESUs) to the point where they are again self-sustaining members of their ecosystems and no longer need the protections of the Endangered Species Act of 1973 (ESA).

It is critically important to base recovery plans in the many state, regional, tribal, local, and private conservation efforts already underway throughout the region. The agency's approach to recovery planning has been to support and participate in locally led collaborative efforts involving local communities, state, tribal, and Federal entities, and other stakeholders to develop recovery plans. On December 15, 2004, the state of Washington and the Lower Columbia Fish Recovery Board (LCFRB) presented the first of these locally developed recovery plans (Plan) to NMFS.

The Plan is an extensive document developed to meet multiple obligations, including state and Federal requirements. As such, the Plan addresses a range of species (including listed and non-listed, aquatic and terrestrial species). ESA-listed aquatic species addressed are salmon, steelhead, and bull trout. NMFS is the lead ESA agency for salmon and steelhead. The U.S. Fish and Wildlife Service (USFWS) is the lead ESA agency for bull trout and is not considered further in this Supplement. This Supplement contains the following components: an overview of how this Plan fits within that context of recovery planning in the NMFS Northwest Region; an overview of the Plan and the process by which it was developed; a discussion of how the Plan satisfies ESA requirements for recovery plans and any additional elements needed to address those requirements; and a description of NMFS' intended use of the Plan.

NMFS expects this Plan, and other plans developed throughout the Northwest Region, to help NMFS and other Federal agencies take a more consistent approach to future section 7 consultations. For example, the Plan will provide greater biological context for the effects that a proposed action may have on listed ESUs. This context will be enhanced by adding recovery plan science to the "best available information" for section 7 consultations. Such information includes viability criteria for ESUs and their independent populations; better understanding of and information on limiting factors and threats facing the ESUs; better information on priority areas for addressing specific limiting factors; and better geographic context for where the ESUs can tolerate different levels of risk. Recovery plans will also help focus funding and other efforts on priority areas and issues and will improve cost effectiveness by identifying priorities and by implementing credible adaptive management frameworks.

## **2 NMFS Northwest Regional Context for the Plan**

NMFS Northwest Region has identified the Willamette/Lower Columbia as one of five geographically based recovery domains for preparing multispecies recovery plans. The other domains are the Interior Columbia, Puget Sound, the Oregon Coast, and the Southern/Oregon Northern California Coast. For each domain, NMFS has appointed an independent Technical Recovery Team (TRT) to develop recommendations on biological viability criteria for ESUs and populations, to do technical work related to limiting factors, to provide scientific support to local and regional recovery planning efforts, and to provide scientific evaluations of recovery plans. The TRTs include biologists from NMFS, state and local wildlife agencies, academic institutions, and private consulting groups.

NMFS' intent for establishing independent TRTs for each domain was to seek unique geographic and species expertise and to develop a solid scientific foundation for recovery plans. Each TRT has utilized

the same biological principles for developing its recommended ESU and population viability criteria. Each TRT's recommendations are based on the members' collective experience and expertise, data availability, and the unique characteristics of the ESUs and habitats in the domain. NMFS has encouraged the TRTs to develop regionally specific approaches for evaluating viability and identifying limiting factors, but each TRT is working from a common scientific foundation to ensure that the recovery plans are scientifically sound and based on consistent principles.

In each domain, NMFS is also working with state, tribal, local and other Federal stakeholders to develop a planning forum appropriate to the domain that builds to the extent possible on ongoing, locally led efforts. The role of these planning forums is to utilize the TRT and other technical products to agree on recovery goals and limiting factors assessments and then to develop locally appropriate and locally supported recovery actions needed to achieve recovery goals. While these forums also are working from a consistent set of assumptions regarding needed recovery plan elements, the process by which they develop those elements, and the form they take, may differ among domains.

As mentioned above, the Plan developed by the LCFRB is the first locally developed plan to be completed and transmitted to NMFS. In July of 2005, NMFS expects to receive additional locally developed recovery plans from five regional recovery boards in Washington: the Shared Strategy for Puget Sound; the Hood Canal Coordinating Council; the Upper Columbia Salmon Recovery Board; the Yakima Subbasin Fish and Wildlife Planning Board, and the Snake River Salmon Recovery Board. NMFS is also working with the states of Oregon and Idaho to have recovery plans drafted throughout the region by December 2005. As draft plans are completed, NMFS will make them available for public review and comment.

### **3 Background and Overview of the Draft Interim Regional Recovery Plan**

The LCFRB was established by Washington State statute in 1998 to oversee and coordinate salmon and steelhead recovery efforts in the lower Columbia region of Washington. The LCFRB comprises representatives from the state legislature, city and county governments, the Cowlitz Tribe, the environmental community, hydroelectric utilities, and concerned citizens. Through an extensive public process starting in January 2002, the LCFRB developed its Plan for the protection and restoration of native fish, aquatic habitats, and sensitive wildlife species in Washington lower Columbia River subbasins.

The Plan was developed to meet the requirements of four interrelated planning initiatives: (1) ESA recovery planning for salmon and steelhead; (2) Northwest Power and Conservation Council fish and wildlife subbasin planning for eight full and three partial subbasins; (3) watershed planning pursuant to the Washington Watershed Management Act; and (4) habitat protection and restoration pursuant to the Washington Salmon Recovery Act. The Plan focuses primarily on salmon and steelhead and contains a strategy that addresses all known threats and integrates an adaptive management approach for recovery actions.

The LCFRB adopted the Plan on December 10, 2004, by a unanimous vote of all board members. The state then approved the Plan and submitted it to NMFS and the USFWS on December 15, 2004, as an interim recovery plan for consideration and inclusion in the formal ESA recovery plans of these agencies.

The Plan covers a substantial portion of the range of three listed ESUs under NMFS jurisdiction: Lower Columbia River Chinook (*Oncorhynchus tshawytscha*); Columbia River Chum (*Oncorhynchus keta*); and

Lower Columbia River Steelhead (*Oncorhynchus mykiss*).<sup>1</sup> The recovery planning area includes the Washington portion of the Columbia River estuary and the Columbia mainstem within the range of the ESUs as well as a number of tributary watersheds (including the Chinook, Grays, Skamokawa, Elochoman, Mill, Abernathy, Germany, Cowlitz, Coweeman, Kalama, Lewis, Lake, Washougal, Duncan, Hardy, Hamilton, Wind, and Little White Salmon rivers). In all, the tributaries total more than 1,700 river miles. The planning area does not include portions of these ESUs on the Oregon side of the Columbia River or in the White Salmon River in Washington.

NMFS proposes to delineate the portion of these ESUs that occurs within Washington State and within the planning area of the Lower Columbia Fish Recovery Board as the Washington Lower Columbia Management Unit. A management unit is a portion of a listed species (ESU) that might require different management due to different threats in certain geographic areas or management by different state, tribal, or local entities.

The Plan is organized into two main volumes and a set of appendices. Volume I is a “regional plan” that lays out overall goals and biological objectives and describes limiting factors, threats, and measures to address them at the regional scale. Volume II is a series of stand-alone subbasin plans that address limiting factors, threats, and measures and actions at the population or subbasin scale. Volume III contains technical appendices.

The Plan incorporates NMFS’ Viable Salmonid Population (VSP) framework (McElhany et al. 2000) as a basis for biological status assessments and recovery goals. The Plan also incorporates the work of the Willamette/Lower Columbia Technical Recovery Team (TRT), which was convened by NMFS to make recommendations on biological criteria for population and ESU viability. The TRT’s recommendations set forth scientific conditions that would indicate a high probability of persistence into the future for salmon and steelhead.

Although final recovery plans must cover the entire range of a species or ESU, NMFS has concluded that it would be disadvantageous to the species to wait to publish this draft Plan until an ESU-wide plan was available. NMFS intends to implement this Plan to the maximum extent practicable while moving forward with the state of Oregon, tribes, and other affected stakeholders to complete a recovery plan that will cover the entire range of the ESUs. In 2006, NMFS expects to publish a notice of availability for a draft regional recovery plan for the Oregon Lower Columbia Management Unit and for the White Salmon River in Washington State. Following public review of the plans for these portions of the ESUs, NMFS will finalize a recovery plan covering the entire range of the ESUs.

### **3.1 Current ESU Status**

Current status for salmon and steelhead ESUs is described in Volume I, Chapter 5, in the context of biological goals and the population status “scoring system” developed by the TRT (McElhany et al. 2003). The TRT developed this scoring system to project population persistence probability based on an integrated assessment of Viable Salmonid Population (VSP) attributes (McElhany et al. 2000) and as a means of estimating ESU viability based on the status of the individual populations within each ESU. The scoring system places populations into the persistence categories shown below in Table 1.

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<sup>1</sup> The Plan also addresses a substantial portion of the range of Lower Columbia River Coho salmon (*Oncorhynchus kisutch*). On June 14, 2004 (69 FR 33103), NMFS proposed Lower Columbia River Coho for listing as threatened. Because this ESU is not currently listed, NMFS is not proposing this Plan as an interim regional recovery plan for Lower Columbia River Coho at this time.

**Table 1** Population persistence categories used to score fish status relative to recovery criteria guidelines (McElhany et al. 2003).

Scale	Viability	Description	Persistence probability (100 years)
0	Very low	Either extinct or very high risk of extinction	0-40%
1	Low	Relatively high risk of extinction	40-74%
2	Medium	Medium risk of extinction	75-94%
3	High	Low (negligible) risk of extinction	95-99%
4	Very High	Very low risk of extinction	>99%

Both the TRT and the LCFRB used this scoring system on Washington lower Columbia populations, and the Plan reflects an averaging of both scores displaying just the qualitative persistence category of the population (e.g., high, medium, low).

The subbasin chapters in Volume II of the Plan provide more detail on population status with summaries of current and historical information on distribution, life history, diversity, abundance, productivity and persistence, hatchery releases, and harvest for each population in a subbasin.

### 3.2 Threats and Limiting Factors

The Plan examines the general threats and limiting factors for salmon and steelhead recovery in Volume I, Chapter 3, with extensive detail provided in each subbasin chapter in Volume II. The major limiting factors are categorized as stream habitat, estuary and lower mainstem habitat, ocean habitat, hydropower, harvest, hatcheries, and ecological interactions. Limiting factors are described in relation to the biological needs of the species, and the threats are described as those activities (e.g., human or naturally induced actions) that lead to the limiting factors. By identifying the threats to recovery, specific recovery strategies and measures can be developed that guide actions at the subbasin level to mitigate the threats.

At the regional scale (Volume I, Chapter 3), the Plan describes historical and current status of each of these limiting factors, identifies the threats that cause it, and discusses how the limiting factor affects salmon and steelhead viability. For most limiting factors, several threats are identified. The subbasin chapters of the Plan (Volume II) present more detail and specificity on the limiting factors and threats as they relate to populations within each subbasin.

The Plan estimates the relative magnitude of potentially manageable impacts in the six categories of manageable limiting factors (i.e., stream habitat, estuary and lower mainstem habitat, hydropower, harvest, hatcheries, and ecological interactions). These estimates are provided for each population in the form of pie charts in the subbasin chapters (Volume II), and summarized in Tables 7-10 (Volume I, Chapter 5) of the Plan. From these analyses, the Plan draws the general conclusion that current salmonid status is the result of large impacts distributed among several factors, and that substantial improvements in salmonid viability will require reductions in mortality in almost all limiting factors.

#### 3.2.1 Stream Habitat

Analyses suggest that stream habitat productivity in the region has been degraded by 20-80 percent relative to properly functioning condition benchmarks for salmon and steelhead.<sup>2</sup> Fish have been

<sup>2</sup> Properly functioning condition benchmarks were defined based on the NMFS "Matrix of Pathways and Indicators" (see NMFS, "Making Endangered Species Act Determinations of Effect for Individual or Grouped Actions at the Watershed Scale," August 1996).

adversely affected by changes in access, stream flow, water quality, sedimentation, habitat diversity, channel stability, riparian conditions, and floodplain interactions. Corresponding threats include dams and other barriers, water withdrawals, urban and rural development, past forest practices, agriculture practices, mining, channel manipulations, and recreational activities. Detailed assessments of stream habitat conditions, watershed conditions, and habitat forming processes may be found in subbasin chapters of the Plan (Volume II).

### **3.2.2 Estuary and Mainstem Habitat**

Estuary and lower Columbia mainstem habitats play an important but poorly understood role in the anadromous fish life cycle. Large-scale changes in river flow, water circulation, sediment transport, and floodplain and wetland destruction or isolation have altered habitat conditions and processes important to migratory and resident fish and wildlife. Hydropower flow regulation, channel alternations, and floodplain development and diking have all contributed to these habitat changes. Estuary conditions and influences are described in detail in a subbasin chapter of the Plan (Volume II, Chapter A).

### **3.2.3 Hydropower**

Habitat conditions for fish and particularly anadromous fish have been fundamentally altered throughout the Columbia River basin by the construction and operation of a complex of tributary and mainstem dams and reservoirs for power generation, navigation, and flood control. Lower Columbia salmon and steelhead are adversely affected by hydrosystem-related flow and water quality effects, obstructed and/or delayed passage, and ecological changes in impoundments. Dams in the Lewis and Cowlitz subbasins have blocked access by anadromous fishes to large areas of productive habitat.

### **3.2.4 Harvest**

Harvest of lower Columbia Chinook salmon occurs in commercial, recreational, and tribal fisheries in the ocean from Alaska to northern California, in the mainstem Columbia, and in some tributaries. Lower Columbia steelhead and chum salmon are rarely taken in ocean fisheries; most harvest of these ESUs occurs in the Columbia mainstem and some tributaries. Harvest rates have generally been reduced from their peak periods as a result of international treaties, fisheries conservation acts, the advent of weak stock management in the 1970s and 1980s, regional conservation goals, and the listing of many salmon and steelhead ESUs under the ESA. Current fishing impact rates on Lower Columbia ESUs range from 2.5 percent for chum salmon to 45 percent for tule fall chinook. While fisheries do not target weak stocks of listed salmon or steelhead ESUs, listed fish are incidentally caught in fisheries directed at hatchery and strong, un-listed wild stocks.

### **3.2.5 Hatcheries**

Hatcheries have been a significant factor in salmon and steelhead production for years. Hatcheries currently release over 50 million salmon and steelhead per year in Washington lower Columbia River subbasins. Many of these fish are released to mitigate for loss of habitat resulting from the Columbia River hydrosystem and widespread habitat loss and degradation. The view of hatcheries and their proper uses and operations has evolved significantly over the last 30 years as risks to naturally spawning populations have become better understood. Hatcheries provide valuable mitigation and/or conservation benefits but may also cause significant adverse impacts if not properly managed. Risks to listed fish from hatchery production include genetic effects that reduce fitness and survival, ecological effects such as competition and predation, facility effects on passage and water quality, mixed-stock fishery effects, and masking the true status of wild populations.

### **3.2.6 Ecological Interactions**

Ecological interactions refer to the relationships of salmon and steelhead with other elements of the ecosystem. Limiting factors include interactions with non-native species and hatchery fish, effects of salmon on system productivity (e.g., nutrient cycling), and native predators of salmon. Each of these



factors can be exacerbated by human activities either by direct actions or indirect effects of habitat alteration.

### 3.3 The Plan's Goals

The Plan's overall vision is that salmon and steelhead will be recovered to healthy, harvestable levels that will support commercial, sport, and tribal fisheries through the restoration and protection of the ecosystems upon which they depend and the implementation of supportive hatchery and harvest practices. The Plan envisions viable, naturally produced salmon and steelhead reproducing naturally in the Plan area. The Plan's vision is consistent with ESA recovery. Decisions regarding levels of impacts from habitat, harvest, hatcheries, and hydropower that will be accommodated during the recovery process will affect when and how recovery (de-listing) goals are achieved, but not the actual quantifiable goals. NMFS supports the Plan's vision of healthy, harvestable salmon and steelhead, as long as harvest, hatcheries, and other human activities support ESA recovery goals. In Section 4.3 of this Supplement, NMFS describes the ESA recovery [or de-listing] criteria for the listed ESUs addressed by the Plan.

The Plan outlines a general approach to salmon and steelhead recovery that is based on the TRT's recommendations for viability (McElhany et al. 2003). From the TRT's guidelines, the LCFRB developed a recovery scenario that integrates the TRT's recommendations for ESU-level viability with specific population-level goals. These population-level goals consist of specific targets for population abundance and productivity, as well as impact reduction targets for the manageable threats to each population. Population-level goals are based on the work of the TRT as well as work by the Washington Department of Fish and Wildlife and the LCFRB. (See Volume I, Chapter 5, of the Plan.)

In developing ESU-level viability guidelines, the TRT introduced the concept of ESU strata. The TRT partitioned the populations within an ESU into a number of strata, which were defined by two factors: ecological zones and major life history differences. Each combination of run timing and ecological zone is a stratum under the TRT's approach. For example, Table 2, below, shows the number of historical independent populations and the strata defined by the TRT for Lower Columbia Chinook.

**Table 2** Strata and Populations in the Willamette/Lower Columbia Recovery Domain

ESU	Ecological Zone	Run Timing (strata)	Historical Populations
Lower Columbia Chinook	Coast Range	Fall	7
		Fall	9
	Cascade	Late fall	2
		Spring	7
	Columbia Gorge	Fall	4
		Spring	2
	Total:		6 strata

In general, the TRT's guidelines for ESU viability state that each stratum that historically existed should have a high probability of persistence. The TRT also recommended that no individual population should be allowed to deteriorate until all strata have reached their recovery goals, and that recovery actions should be attempted in more populations than what is required, due to the likelihood that some recovery efforts will fail. High probability of stratum persistence is defined as: (a) at least two populations in the stratum have at least a 95% probability of persistence (i.e., two populations with a score of 3.0 or higher based on the TRT's scoring system) and (b) other populations in the stratum have persistence

probabilities consistent with a high probability of stratum persistence (i.e., the average of all stratum population scores is 2.25 or higher, based on the TRT's scoring system).

### **3.3.1 The Recovery Scenario**

The LCFRB developed the recovery scenario through a collaborative process with a representative group of stakeholders. The preferred scenario was a decision based on both biological considerations and policy factors, including social, cultural, political, and economic considerations. The scenario is discussed in detail in Section 4.2, below. Individual populations are classified as either *primary* (targeted for restoration to high or high+ probability of persistence), *contributing* (targeted for restoration to low or medium probability of persistence), or *stabilizing* (populations that are to be maintained at current levels and likely to have low probabilities of persistence).

The recovery scenario is consistent with the TRT's guidelines except for the Gorge stratum for fall chinook, spring chinook, and chum, where, due to passage impediments and habitat loss caused by Bonneville Dam, the LCFRB determined that achieving the TRT's criteria was highly unlikely. To compensate, the LCFRB established lower risk scenarios for other fall chinook, spring chinook, and chum strata than would have been required to meet the TRT's guidelines, and also noted the uncertainty inherent in the TRT's stratum distinctions.

For Oregon populations within the Lower Columbia ESUs, the LCFRB made assumptions that are reflected in the recovery scenario. These assumptions were developed to assess how the Plan fit within the full ESU perspective. They were coordinated with the state of Oregon but do not represent final decisions on population targets by the state of Oregon or NMFS.

### **3.3.2 Abundance and Productivity Goals**

The TRT developed guidelines based on a series of population parameters, including the VSP parameters of adult productivity and abundance, within-population spatial structure, and within-population diversity (McElhany et al. 2000), as well as additional parameters of juvenile out-migrant production and general habitat health. The Plan identifies specific numerical goals for population abundance and productivity. Abundance goals are detailed in the Plan in Tables 3 through 6 (Volume I, Chapter 5), and productivity goals are described in Tables 7 through 10 (Volume I, Chapter 5) of the Plan. These goals are based on the TRT's recommendations as well as on technical work by WDFW and the LCFRB.

Specific goals were not identified for parameters other than abundance and productivity because many different combinations of specific parameters can be expected to achieve the overarching population goals. This approach allows for flexibility in tailoring recovery strategies to the threats and opportunities in each area. All VSP parameters are closely associated such that improvements in one parameter typically cause or are related to improvements in other parameters. The Plan expects that specific benchmark values for other VSP parameters will be refined during Plan implementation based on new information that addresses current uncertainties.

### **3.3.3 Incremental Improvements – Threat Reduction**

To reach the abundance and productivity goals in the Plan, the LCFRB proposes an integrated strategy of reducing all manageable threats to each population. The LCFRB estimated mortality at the time of listing from each category of manageable threats for each population and then identified impact reduction goals in each category, consistent with the population's abundance and productivity goals. Tables 7-10 (Volume I, Chapter 5) of the Plan identify these baseline impacts and reduced impact levels consistent with meeting the overall productivity goal. Appendix E (Volume III) provides more detail and technical documentation of this approach. This strategy allocates the recovery burden proportionately across the six major impact categories that can be managed: stream habitat, estuary and lower mainstem habitat, hydropower, harvest, hatcheries, and ecological interactions. These proportional improvements are

identified as starting points to indicate the general level of effort that will be required from each sector to achieve recovery. They are not intended to be used as benchmarks or hard and fast targets.

The LCFRB used this approach with the assumption that recovery will require significant improvements in multiple risk factors, and that it will be unlikely to reach the specified recovery goals based solely on improvements in any single impact category. Despite uncertainty in this analysis, it provides a reasoned starting point from which recovery actions can be prioritized based on reducing the known causes of mortality. Future information gained during the monitoring and adaptive management phase will allow for the re-evaluation and further refinement of this approach.

### **3.4 Hypotheses, Strategies, and Measures for Recovery**

The Plan contains working hypotheses and regional strategies and measures that address the limiting factors and threats in each of the seven categories (Volume I, Chapter 6). Working hypotheses are the assumptions and beliefs that underlie selection and definition of strategies and measures. Regional strategies and measures identify general approaches and categories of actions needed to recover salmon and steelhead. Strategies are based on underlying working hypotheses, which describe assumptions, conclusions, or testable hypotheses. Explanations are included for each element to clarify the scientific basis, strength of rationale, and relationship to current practice. Measures are more specific means by which strategies will be accomplished.

At the regional level, strategies and measures are not prioritized among or within limiting factor categories. At the subbasin level, relevant strategies from the regional plan in Volume I, Chapter 6, are repeated for each subbasin or population, and for freshwater habitat and hatcheries, more specific “actions” are identified, and tributary habitat measures are prioritized.

An example of a measure from each category:

*Tributary Habitat:* Protect habitat conditions and watershed functions through land-use planning that guides human population growth and development

*Estuary and Lower Mainstem Habitat:* Restore tidal swamp and marsh habitat in the estuary and tidal freshwater portion of the lower Columbia River.

*Hydropower:* Evaluate and adaptively implement anadromous fish reintroduction upstream of Cowlitz and Lewis dams and facilities as part of hydropower facility relicensing processes or requirements.

*Harvest:* Consider recovery goals for lower Columbia salmon and steelhead populations as identified in the Lower Columbia Recovery Plan in annual fishery management processes.

*Hatcheries:* Design hatchery programs to be consistent with region-wide recovery and the ecological context of the watershed.

*Ecological Interactions:* Consider the potential for both positive and negative impacts of American shad on salmon as well as the feasibility and advisability of shad management measures.

More detailed recovery actions are identified in the subbasin chapters in Volume II of the Plan and in Table 8-1 of the Plan’s Implementation chapter (Volume I, Chapter 8), which summarizes all Plan actions. As described above, measures are general descriptions of the desired actions (e.g., protect and restore riparian habitat). Actions go into more detail than measures, and are related directly to the desired biological or physical effect. Actions also describe the implementing organization and program level. For example, in the Plan (Table 8-1), the first proposed action is that the City of Battleground “Expand standards in local land use plans and controls to afford adequate protections of ecologically important areas.”

Tributary habitat measures are prioritized based on the results of subbasin habitat assessment and in consideration of principles of ecosystem restoration (e.g., Roni et al. 2002). Prioritized measures are then targeted for implementation in priority stream reaches and subwatersheds. For freshwater habitat, the subbasin chapters also discuss the ability of existing programs to fully implement each measure and provide a qualitative evaluation of their sufficiency. Actions are then proposed to fill any gaps.

### **3.5 Implementation and Adaptive Management**

While we do not currently have tools to evaluate precisely the outcome of a full suite of recovery actions, we can identify actions that are needed to achieve recovery and that indicate the level of effort that will be needed to achieve recovery objectives. Hence the Plan takes a “directional approach,” in which actions are directed toward reducing all of the human-caused factors limiting recovery. Information gained through an adaptive management program will help refine these approaches such that at some point in the future a more focused and theoretically more cost-effective approach may be taken.

The institutional structure for Plan implementation involves oversight, implementation, and facilitation/coordination responsibilities. Key oversight bodies include NMFS, USFWS, tribal governments, the Washington Department of Fish and Wildlife, the Washington Governor’s Office, and the Northwest Power and Conservation Council. The Lower Columbia Fish Recovery Board, working with a steering committee, will facilitate and coordinate efforts among oversight and implementing partners. The steering committee will include representatives of all the oversight bodies and a cross-section of implementing partners. Facilitation/coordination will involve setting priorities, evaluating progress, tracking implementation, inventorying and synthesizing monitoring results, developing implementation partnerships and agreements, and revising the Plan.

Implementation of the Plan includes an adaptive management framework that involves checkpoints at 2-year intervals to assess action implementation, at 6-year intervals to assess action effectiveness and threat reduction, and at 12-year intervals to assess fish and habitat status. Benchmarks will be developed against which to evaluate observed progress. (NMFS will work with the LCFRB to integrate these check-in points with the status evaluations described in Section 4.3.1, below.)

In the first phase after completing the Plan, the LCFRB will be soliciting six-year implementation schedules from all the entities with a role in implementing actions described in the Plan. These six-year schedules will provide additional detail on how actions will be implemented and will include estimates of the cost of implementing the actions. During this phase, benchmarks will also be developed for the first six years of Plan implementation.

### **3.6 Monitoring, Research, and Evaluation**

Monitoring, research, and evaluation measures detailed in the Plan provide elements of a coordinated regional program supporting the Plan’s salmon recovery (Volume I, Chapter 7). Included are objectives, indicators, sampling approaches, and methods of analysis.

Monitoring measures involve regular sampling and measurement of representative biological, physical, or programmatic parameters. Monitoring includes a mixture of activities of varying intensity, ranging from routine monitoring that involves repeated measurements of representative indices at regular intervals to statistical monitoring intended to provide inferences to larger areas and longer time periods. The monitoring component includes the following categories:

- *Biological status monitoring:* priorities for monitoring by watershed and population are described based on a schedule for the first 9 years of Plan implementation. The annual costs for monitoring

and the funding sources are included and are generally based on the types of activities planned. Monitoring is separated into routine and intensive monitoring areas with the level of effort divided into three levels for the intensive monitoring program.

- *Habitat status monitoring:* monitor watershed conditions, water quality, stream habitat, with some limited intensively monitored basins.
- *Action effectiveness monitoring:* monitor to determine the effectiveness of actions under each of the impact categories.
- *Implementation:* monitor the actual implementation of on-the-ground actions to determine if all entities are meeting their obligations and schedule for implementation of the Plan's actions.
- *Critical uncertainty research:* an important aspect of the Plan is to better understand the threats to salmon and steelhead and the implications to recovery. Also, effort will be placed into validating and testing hypotheses and actions taken in the Plan.
- *Evaluation:* integrate all the above information and determine if goals are being met, and refine the biological objectives, strategies, measures, actions, and priorities as necessary.

Critical uncertainty research is focused on cause and effect relationships between fish, limiting factors/threats, and actions that address specific factors/threats. These critical uncertainties constrain our ability to identify or evaluate the effects of specific actions. The Plan identifies a series of critical research questions for each threat category.

Coordination and data management measures are included to ensure efficient implementation of a comprehensive and complementary program as well as accessibility and effective application of the associated data. An approach will be based on a detailed management needs assessment and data management plan.

### **3.7 Previous Public and Scientific Review**

The Plan underwent extensive public and scientific review during development and was revised as appropriate in response to the reviews. A description of Plan development and a list of public meetings held during its development are provided in Volume I, Chapter 9. Summarized below are major comment periods and participants. Because the Plan underwent scientific and peer review and appropriate revision during development, NMFS has determined that further scientific peer review of the Plan is not needed at this time. Additional peer review will take place when the Oregon and Washington management unit plans are merged into a single recovery plan for the ESUs.

#### **3.7.1 Community and Public Participation**

The planning process involved a series of work groups and other opportunities for community and public participation. These included:

- Numerous presentations made to agencies, local governments, groups, and organizations regarding recovery issues and the planning process.
- A 30-day public comment period and a series of workshops on the Plan's Technical Foundation.
- "Scenario Evaluation Team" meetings, which brought together agency personnel, citizens, economic interests, timber companies, local government officials, and non-profit organizations to discuss plausible recovery scenarios.
- Four stakeholder workshops to review and comment on regional strategies and measures.
- A 60-day public comment period on the draft plan in conjunction with the NPCC subbasin plan review process in June-August 2004.
- A public comment period on a revised draft of the Plan in October-November 2004.

### **3.7.2 Scientific Review**

The LCFRB planning process was an integrated planning process designed to meet several objectives, including ESA recovery planning requirements and subbasin planning requirements under the Northwest Power and Conservation Council's (Council) Fish and Wildlife Program. The subbasin planning process was integrated closely with recovery planning at the Columbia Basin level. NMFS worked with the Council to describe the relationship of subbasin planning and recovery planning, NMFS and Council staff worked together to develop a Technical Guide for Subbasin Planners, and NMFS worked with the Council in developing the peer review questions used by the subbasin plan peer reviewers so that the subbasin planning peer review would address NMFS' needs for recovery planning. Draft subbasin plans were submitted to the Council on May 28, 2004. A number of independent science groups, including NMFS' and the Council's Independent Scientific Review Panel and the Council's Independent Scientific Advisory Board, reviewed subbasin plans—including the suite of plans developed by the LCFRB to meet both subbasin planning and ESA requirements—from June through August 2004. A roster of reviewers and copies of the comments are available at [www.nwcouncil.org](http://www.nwcouncil.org).

The TRT consists of scientists internal and external to NMFS and is intended to serve as an independent science group advising NMFS on recovery planning. The members of the TRT represent a variety of agencies, fields, and academic institutions and provide a heterogeneous viewpoint on the development of products or for reviews. The TRT chair is from NOAA's Northwest Fisheries Science Center. The TRT reviewed the Plan's draft Technical Foundation and the May 28, 2004, version of the Plan. Copies of the TRT's comments are available from NMFS upon request.

The TRT's *Interim Report on Viability Criteria* (McElhany et al. 2003), which forms the basis for the recovery goals in the Plan, has had 3 major revisions: May 2002, December 2002, and March 2003. The most comprehensive review of the TRT's work took place on the May 2002 draft. It was sent out to 14 academicians, 13 agencies, and 14 NMFS scientists not affiliated with the TRT. The December 2002 and March 2003 drafts were sent out for review to various co-managers.

## **4 The Plan and ESA Recovery Plan Requirements**

When a species under NMFS' jurisdiction is listed as threatened or endangered under the ESA, the agency is required to develop and implement a recovery plan for the conservation and survival of that species. There are three specific statutory requirements for a recovery plan, set forth in Section 4(f)(1)(B) of the ESA; these are that each plan incorporate:

1. A description of site-specific management actions necessary to achieve the plan's goal for the conservation and survival of the species;
2. Objective, measurable criteria which, when met, would result in a determination, in accordance with the provisions of this section, that the species be removed from the list; and
3. Estimates of the time required and cost to carry out those measures needed to achieve the plan's goal and to achieve intermediate steps toward that goal.

In addition to these statutory requirements, recovery plans should contain a more general statement of goals and a recovery strategy that describes the overall approach to recovery for the species. These recovery plan elements, as they are addressed by the Plan, are discussed below.

### **4.1 Recovery Goal**

A goal of this Plan is to restore the Lower Columbia River Chinook (*Oncorhynchus tshawytscha*), Columbia River Chum (*Oncorhynchus keta*), and Lower Columbia River Steelhead (*Oncorhynchus*

*mykiss*) ESUs and their ecosystems to the point where their protection under the ESA is no longer required.

ESA recovery does not require the return of a species to all of its historic range, nor does it require attainment of full carrying capacity of available habitat, as long as an ESU is demonstrably secure. Sections 4.3 and 4.4, below, describe a combination of biological and listing factor (threats) criteria that, taken together, describe conditions, commitments, and administrative measures that, when met, would result in a determination that the species is not likely to become endangered within the foreseeable future throughout all or a significant portion of its range. Moreover, NMFS' goals for sustainable fisheries are not necessarily satisfied by achievement of a recovery threshold and removal of a salmon or steelhead ESU from the list of threatened or endangered species. NMFS would continue to support the management of sustainable fisheries under the Magnuson-Stevens Fisheries Act and other authorities.

## 4.2 Recovery Strategy

The Plan's overall recovery strategy is to accomplish the "recovery scenario," which identifies an ESU scenario and corresponding population-level goals that are based on the TRT's recommendations. The Plan aims to accomplish this scenario by reducing threats in all manageable impact categories (stream habitat, estuary and mainstem habitat, hydropower, harvest, hatcheries, and ecological interactions). Threat reduction targets (see Tables 7-10, Volume I, Chapter 5, of the Plan) identify baseline impacts and reduced impact levels consistent with meeting the overall productivity goal for each population. These threat reduction targets are used as a starting point and as an indication of the general level of effort that will be required to achieve recovery rather than as benchmarks or hard and fast targets.

Because it is not possible at this time to answer the question of exactly how many actions of what type and magnitude will be required to achieve recovery, the Plan establishes a "directional" approach to recovery. This approach identifies actions that address all threats and establishes a monitoring, evaluation, and adaptive management framework so that adjustments in actions and goals can be made over time as understanding of the effectiveness and costs of various actions and their impact on ESU status improves.

The Plan's recovery scenario identifies a combination of populations and population goals that, when achieved, would satisfy the recovery criteria (see Section 4.3 below). The recovery scenario was developed with consideration of the recovery feasibility and the biological significance of each population to the ESU. Biological significance was based on current status, potential for improvement, historical significance, proximity to other selected populations with reference to catastrophic risks, and location relative to strata with reduced expectations. Feasibility of recovery was evaluated based on expected progress as a result of existing programs, absence of apparent impediments to recovery, and other management considerations.

The recovery scenario is one of several possible combinations of population goals that could meet the recovery criteria. Different scenarios might fulfill the biological requirements for recovery but have unique implications for various stakeholders. The Plan's recovery scenario was developed through a collaborative process with a representative group of stakeholders. It represents the Plan's overall strategy to reach recovery, but alternative combinations of population status levels within an ESU could also meet the recovery criteria.

The recovery scenario designates individual population goals at three levels of contribution:

***Primary populations*** are those that would be restored to high or "high+" viability. At least two populations per stratum must be at high or high+ viability to meet recommended TRT criteria.

Primary populations typically, but not always, include those of high significance and medium current viability. In several instances, populations with low or very low current viability were designated as primary populations to achieve viable strata and ESU conditions. In addition, where factors suggest that a greater than high viability level can be achieved, populations have been designated as High+. High+ indicates that the population is targeted to reach a viability level between High and Very High levels as defined by the TRT.

**Contributing populations** are those for which some restoration will be needed—generally to a medium level of population persistence—to achieve a stratum-wide high probability of persistence. Contributing populations include those of low to medium significance and viability where improvements can be expected to contribute to recovery.

**Stabilizing populations** are those that would be maintained at current levels (likely to be low viability). Stabilizing populations generally include those where significance is low, feasibility is low, and uncertainty is high.

The recovery scenario describes the target status (i.e., primary, contributing, or stabilizing) for each population within the ESUs (see Table 3, below).

**Table 3 Recovery Scenario, including Primary (P), Contributing (C), and Stabilizing (S) population designations.** Respective target viabilities are high or high+, low or medium, and no lower than current levels. Primary populations identified for greater than high viability objectives are denoted with an ‘\*’. X refers to subset of larger population. Dashes indicate species was not historically present.

Ecological zone	Populations	Chinook			Chum	Steelhead	
		Fall (tule)	Fall (bright)	Spring		Winter	Summer
COAST	Grays/Chinook	P	--	--	P*	P <sup>1</sup>	--
	Elochoman/Skamokawa	P	--	--	P	C	--
	Mill/Abernathy/Germany	C	--	--	P	P <sup>1</sup>	--
	Youngs Bay (OR)	S	--	--	P	na <sup>1</sup>	--
	Big Creek (OR)	S	--	--	C	na <sup>1</sup>	--
	Clatskanie (OR)	P	--	--	C	na <sup>1</sup>	--
	Scappoose (OR)	S	--	--	C	na <sup>1</sup>	--
CASCADE	Lower Cowlitz	C	--	--	C	C	--
	Upper Cowlitz	S	--	P*	--	C	--
	Cispus	--	--	P*	--	C	--
	Tilton	--	--	S	--	C	--
	SF Toutle	X	--	C	X	P*	--
	NF Toutle	S	--	X	X	P	--
	Coweeman	P*	--	--	X	P	--
	Kalama	P	--	P	C	P*	P
	Lewis (NF)	X	P*	P	X	C	S
	EF Lewis	P*	--	--	P	P	P
	Salmon	X	--	--	S	S	--
	Washougal	P	--	--	P*	C	P*
	Sandy (OR)	S	P	P	P	P	--
	Clackamas (OR)	C	--	--	C	P	--
GORGE	Lower Gorge	C	--	--	P*	P	--
	Upper Gorge	S	--	--	C	S	P*



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	White Salmon	C	--	C	--	--	--
	Hood (OR)	S	--	P	--	P	P

Note: It is assumed that one tule fall chinook and one chum population in Oregon will be “primary” category and three chum populations will be in the “contributing” category. Assignments of specific populations shown are illustrative only. Oregon will identify specific assignments upon completing its population review.

The underlying population-level goals are described in Volume I, Chapter 5, Tables 3-6 and 7-10, of the Plan. At least two populations are targeted for improvement to high or high+ levels of viability in every stratum except for strata within the Gorge ecological zone. Overall, the recovery scenario would restore each salmonid stratum (except for the Gorge strata) to an average viability of medium or higher. Population and strata viability goals are higher than the minimum required to meet TRT interim viability criteria to provide a safety factor should goals for some populations not be achieved.

Recovery opportunities in the Gorge are limited by the small numbers of populations and the high uncertainty of restoration feasibility because of Bonneville Dam. Recovery of Gorge populations will be attempted, but recovery to high viability is highly uncertain given the continued impacts of Bonneville Dam. The TRT’s strata delineations between the Gorge and Cascade strata populations are also uncertain, and several chum and chinook populations downstream from Bonneville Dam may be quite similar to those upstream of Bonneville Dam. The recovery scenario identifies improvement in more than the minimum number of populations required, including several in the adjacent strata, to provide a safety factor should not all attempts in the Gorge prove successful. This is a more precautionary approach to recovery in the Gorge strata than merely assuming those efforts would be successful. Additionally, monitoring and adaptive management during implementation will provide more information on the feasibility of recovering chinook and chum populations above Bonneville Dam and may lead to adjustments in actions and expectations.

Recovery for salmon and steelhead will require substantial action in most subbasins. Several Washington subbasins have been identified with the potential to provide substantial contributions to the viability of multiple populations of salmon and steelhead. These are the Grays and Elochoman in the coast ecological zone; the Cowlitz, Kalama, Lewis, and Washougal in the Cascade ecological zone; and the lower Gorge in the Gorge ecological zone. Substantial improvements are not required in some severely degraded subbasins although recovery goals require additional protection and restoration efforts to prevent further declines until recovery of other populations is achieved (e.g., Salmon Creek).

#### **4.3 Criteria for Removing the Species from the Federal List of Endangered and Threatened Wildlife and Plants**

The requirement for determining that a species no longer requires the protection of the ESA is that the species no longer be in danger of extinction or likely to become endangered within the foreseeable future based on evaluation of the listing factors specified in ESA Section 4(a)(1). To remove the Lower Columbia River Chinook, Columbia River Chum, and Lower Columbia River Steelhead ESUs from the Federal List of Endangered and Threatened Wildlife and Plants (i.e., to de-list), NMFS must determine that the ESUs, as evaluated under the ESA listing factors, are no longer likely to become endangered. Any new factors identified since listing must also be addressed in this analysis to ensure that the species no longer requires protection as a threatened species.

The ESA requires that recovery plans, to the maximum extent practicable, incorporate objective, measurable criteria which, when met, would result in a determination in accordance with the provisions of the ESA that the species be removed from the Federal List of Endangered and Threatened Wildlife and Plants (50 CFR 17.11 and 17.12). The recovery criteria comprise the core standards that NMFS believes will lead to conditions upon which the decision to de-list a species will be based. The ESA’s listing

factors, and not the Recovery Plan, are the legal basis upon which de-listing decisions will be made. Section 4.3.1 describes biological recovery criteria and Section 4.3.2 describes listing factor, or threats, criteria.

#### **4.3.1 Biological Recovery Criteria Background**

On June 14, 2004, NMFS published proposed listing determinations for west coast salmonid ESUs (69 FR 33102). In this notice, NMFS described its process for making listing determinations, including scientific analyses that evaluated ESU viability, factors for decline, and efforts being made to protect the ESU.

That notice described how NMFS and its Biological Review Team (BRT) used VSP criteria in assessing and evaluating extinction risk for salmonids, including the three ESUs that are the subject of the Plan.<sup>3</sup> Informed by the BRT's findings and NMFS' assessment of the effects of artificial propagation programs on the viability of the ESUs, NMFS concluded that the three ESUs are "likely to become endangered in the foreseeable future."

The TRT based its work on the same VSP framework utilized by BRT in the status review and listing process. The TRT work, however, represents a more rigorous and detailed analysis of viability and extinction risk for these ESUs.

##### **4.3.1.1 Biological Criteria**

After reviewing the viability criteria recommended by the TRT (McElhany et al. 2003 and summarized below and in Section 3.3, above) NMFS has determined that the TRT's recommendations adequately describe the characteristics of an ESU that meet or exceed the requirement described above, in Section 4.3.

NMFS therefore will propose to delist the three listed ESUs addressed by this Plan when the following criteria are achieved for the entire ESUs (not just for the Washington Lower Columbia Management Unit):

1. All strata that historically existed have a high probability of persistence. High probability of stratum persistence is defined as:
  - a. At least two populations in the stratum have at least a 95 percent probability of persistence (i.e., two populations with a score of 3.0 or higher based on the TRT's scoring system)
  - b. Other populations in the stratum have persistence probabilities consistent with a high probability of stratum persistence (i.e., the average of all stratum population scores is 2.25 or higher, based on the TRT's scoring system). (See Section 3.1, above, for a brief discussion of the TRT's scoring system.)
2. The threats identified below in Section 4.3.2 have been addressed.

NMFS recognizes that these criteria may represent a standard that exceeds, to some degree, the requirements for de-listing under the ESA. At this time the information necessary to further refine these criteria is not available, and is not likely to become available within the near future. For this reason, the criteria stated above should be understood as a point at which de-listing is very likely but not necessarily as the minimum status necessary to qualify for de-listing. Nothing in these criteria should be understood as precluding a de-listing determination in circumstances where not all the criteria have been satisfied,

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<sup>3</sup> See Updated status of Federally listed ESUs of West Coast salmon and steelhead. West Coast Salmon Biological Review Team. NOAA Fisheries Northwest and Southwest Salmon Biological Review Team. July 13, 2003.

provided that the ESU is no longer in danger of extinction or likely to become endangered within the foreseeable future.

In accordance with our responsibilities under Section 4(c)(2) of the Act, NMFS will conduct status reviews of the affected ESUs at least once every five years to evaluate the ESUs' status and determine whether the ESUs should be removed from the list or changed in status. Such evaluations will take into account the following:

- Principles laid out in the Viable Salmonid Population paper (McElhany et al. 2000);
- Recommendations in the Willamette/Lower Columbia TRT's Interim Report on Viability Criteria (McElhany et al. 2003);
- Best available information on population and ESU status and new advances in risk evaluation methodologies; and
- Considerations consistent with the VSP paper and the TRT's recommendations include: the number of viable populations; the number and status of other extant populations; the status of core populations; the distribution of viable populations relative to the range of historical conditions supporting viable populations; linkages and connectivity among viable populations; the diversity of life history and phenotypes expressed; and considerations regarding catastrophic risk.

The biological goals of the Plan are generally consistent with the recommendations of the TRT. The Plan diverges from the TRT's criteria only in its treatment of the following strata: Gorge fall chinook, Gorge spring chinook, and Gorge chum (see above, Sections 3.3.1 and 4.2). The Plan describes a clear rationale for this divergence from the TRT's recommendations and a clear argument that the ESU scenarios proposed by the Plan, if achieved, would represent ESUs that were not likely to become endangered in the foreseeable future throughout all or a significant portion of their range. NMFS believes that if the biological criteria of the Plan were met, for the entire ESUs (not just the Washington Lower Columbia Management Unit), and if the threats were adequately addressed, a determination would result that the ESUs were no longer likely to become endangered in the foreseeable future throughout all or a significant portion of their range, and that the ESUs could be proposed for removal from the Federal List of Endangered and Threatened Wildlife and Plants.

Table 4 through Table 6 below show the Plan's abundance targets for individual populations (organized by ESU and stratum), consistent with the criteria above and the ESU scenario described above in Section 4.2, Table 3. The abundance goals should be considered a reference point rather than an absolute threshold. The goals were established based on assumptions regarding the time frame of measurement, the fraction of naturally spawning hatchery origin fish, and future marine survival patterns. A clear understanding of these goals requires a thorough consideration of these assumptions (for example, meeting abundance criteria in a single year is not sufficient to reach conclusions regarding viability). As data on these factors is collected, the abundance targets will be refined. Abundance is also only one parameter used to estimate population and ESU extinction risk. Productivity is a crucially important indicator of extinction risk—and productivity criteria for each population are described in the Plan (see Tables 7-9, Volume I, Chapter 5) and in the TRT's *Interim Report on Viability Criteria* (McElhany et al. 2003).

Current viability of Oregon populations within the three ESUs is not included in the tables below because NMFS and the Willamette-Lower Columbia TRT are still working with the state of Oregon to assess current population status. Similarly, abundance goals for Oregon populations are not included in the tables, pending completion of work with Oregon on those goals. Where the tables indicate that current abundance for a population is not available (na), actual monitoring data were insufficient to adequately

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estimate recent abundance. A draft plan addressing the Oregon populations within these ESUs is expected in December 2005.

**Table 4 Recovery goals for lower Columbia River Chinook populations.**

	Scenario	Viability		Abundance	
Population	Contrib.	Current	Goal	Current	Goal
<b><u>Coast Fall</u></b>					
Grays/Chinook	Primary	Low+	High	73	1,400
Eloch/Skam	Primary	Low+	High	140	1,400
Mill/Aber/Germ	Contributing	Low	Med	250	1,100
Youngs Bay (OR)	Stabilizing	na	Low	na	na
Big Creek (OR)	Stabilizing	na	Low+	na	na
Clatskanie (OR)	Primary	na	High	na	na
Scappoose (OR)	Stabilizing	na	Low	na	na
<b><u>Cascade Fall</u></b>					
Lower Cowlitz	Contributing	Low+	Med	602	2,300
Upper Cowlitz	Stabilizing	V Low	V Low	0	na
Toutle	Stabilizing	Low	Low	1,000	1,000
Coweeman	Primary	Med	High+	425	3,600
Kalama	Primary	Low+	High	1,192	1,300
Lewis/Salmon	Primary	Med	High+	235	2,900
Washougal	Primary	Low+	High	1,225	5,800
Clackamas (OR)	Contributing	na	Med	56	na
Sandy (OR)	Stabilizing	na	Low+	208	na
<b><u>Cascade L Fall</u></b>					
Lewis NF	Primary	Med+	High+	6,493	11,600
Sandy (OR)	Primary	na	Low+	445	na
<b><u>Cascade Spring</u></b>					
Upper Cowlitz	Primary	Low	High+	365	5,400
Cispus	Primary	Low	High+	150	1,800
Tilton	Stabilizing	V Low	V Low	150	150
Toutle	Contributing	V Low	Med	150	800
Kalama	Primary	V Low	High	105	1,400
Lewis NF	Primary	V Low	High	300	2,200
Sandy (OR)	Primary	na	High	2,649	na
<b><u>Gorge Fall</u></b>					
L. Gorge (Hamilton)	Contributing	Low	Med	na	700
U. Gorge (Wind)	Stabilizing	Low	Low	138	100
White Salmon	Contributing	Low	Med	174	900
Hood (OR)	Stabilizing	na	Low+	na	na
<b><u>Gorge Spring</u></b>					
White Salmon	Contributing	V Low	Low	0	400
Hood (OR)	Primary	na	High	0	na

Notes (for Table 4 through Table 6)

1. Primary, contributing, and stabilizing designations are based on priorities identified in the recovery scenario.
2. Current viability is based on Technical Recovery Team viability rating approach.
3. Viability goal is related to the scenario contribution.
4. Current abundance numbers are observed 4-year averages or assumed natural spawning escapements. Data typically are through year 2000.
5. Abundance goals are interpolated from current, viable, and/or potential numbers based on viability goals—see the Plan, Volume I, Chapter 5, for additional explanation.
6. These approximations are considered working hypotheses that provide benchmarks for scaling recovery strategies and a reference point for future monitoring, evaluation, and adaptation.

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**Table 5 Recovery goals for lower Columbia River chum populations.**

	Scenario	Viability		Abundance	
Population	contrib.	Current	Goal	Current	Goal
<u>Coast</u>					
Grays/Chinook	Primary	Low+	High+	960	6,000
Eloch/Skam	Primary	Low	High	<150	1,100
Mill/Ab/Germ	Primary	V Low	High	<150	1,100
Youngs (OR)	Primary	na	High	na	na
Big Creek (OR)	Contributing	na	Low	na	na
Clatskanie (OR)	Contributing	na	Med	na	na
Scappoose (OR)	Contributing	na	Low	na	na
<u>Cascade</u>					
Cowlitz	Contributing	V Low	Med	<150	600
Kalama	Contributing	V Low	Low	<150	150
Lewis	Primary	V Low	High	<150	1,100
Salmon	Stabilizing	V Low	V Low	<150	75
Washougal	Primary	Low	High+	<150	5,200
Clackamas (OR)	Contributing	na	Med	na	na
Sandy (OR)	Primary	na	High	na	na
<u>Gorge</u>					
Lower Gorge	Primary	Med+	High+	542	2,800
Upper Gorge	Contributing	V Low	Med	<100	600

**Table 6 Recovery goals for lower Columbia River steelhead populations.**

	Scenario	Viability		Abundance	
Population	contrib.	Current	Goal	Current	Goal
<b><u>Cascade Winter</u></b>					
Lower Cowlitz	Contributing	Low	Med	na	300
Coweeman	Primary	Low+	High	228	800
S.F. Toutle	Primary	Med	High+	453	1,600
N.F. Toutle	Primary	Low	High	176	700
Upper Cowlitz	Contributing	Low	Med	0	300
Cispus	Contributing	Low	Med	0	300
Tilton	Contributing	V Low	Low	0	150
Kalama	Primary	Med+	High+	541	650
N.F. Lewis	Contributing	Low	Med	na	300
E.F. Lewis	Primary	Low+	High	77	600
Salmon	Stabilizing	Low	Low	na	300
Washougal	Contributing	Low+	Med	421	500
Clackamas (OR)	Primary	na	High	277	na
Sandy (OR)	Primary	na	High	589	na
<b><u>Cascade Summer</u></b>					
Kalama	Primary	Low+	High	291	700
N.F. Lewis	Stabilizing	V Low	V Low	na	75
E.F. Lewis	Primary	Low+	High	463	200

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Washougal	Primary	Low+	High+	136	700
<b><u>Gorge Winter</u></b>					
L. Gorge (HHD)	Primary	Low+	High	na	200
U. Gorge ( <i>Wind</i> )	Stabilizing	Low+	Low+	na	50
Hood (OR)	Primary	na	High	436	na
<b><u>Gorge Summer</u></b>					
Wind	Primary	Med+	High+	391	1,600
Hood (OR)	Primary	na	High	154	na

#### 4.3.2 Listing Factor (Threats) Criteria

Evaluating a species for potential reclassification or de-listing requires an explicit analysis of threats under the five ESA listing factors at ESA Section 4(a)(1) in addition to evaluation of population or demographic parameters. Establishing criteria for each of the relevant listing/de-listing factors helps to ensure that underlying causes of decline have been addressed and mitigated prior to considering a species for de-listing. Legal challenges to recovery plans have affirmed the need to frame recovery criteria in terms of threats as assessed under the five listing factors. While the Plan does not include explicit listing factor criteria, it does include an inclusive list of threats and limiting factors (Volume I, Chapter 3). The Plan describes the impacts to salmon and steelhead that have resulted from hydropower operation, harvest, habitat destruction, hatchery operations, and changes within marine and freshwater ecosystems.

Based on the information contained in the Plan, NMFS proposes that, to determine that the affected ESUs are recovered to the point where they no longer require the protections of the ESA, the following listing-factor criteria should be addressed so that de-listing is not likely to result in re-emergence of the threat. NMFS recognizes that these criteria are not all of equal importance in securing the continuing recovery of the ESU and therefore may not require every potential threat to be fully addressed before proposing de-listing. However, substantial progress toward resolving the threats listed below will be needed. It is also possible that current perceived threats will become insignificant in the future due to changes in the natural environment or changes in the way threats affect the entire life cycle of salmon and steelhead. In the status evaluations discussed above under Section 4.3.1, NMFS will evaluate and review the criteria under these listing factors to determine their relevance under conditions at the time.

##### 4.3.2.1 Factor A: The present or threatened destruction, modification, or curtailment of a species' habitat or range

All three ESUs have declined in response to a wide variety of impacts upon streams and watersheds. Reducing threats to habitat must be accomplished through a broad application of measures to restore and protect watershed, riparian, and stream channel structure and function, and to restore and protect water quality and quantity.

To determine that any one of the three ESUs is recovered, threats to habitat, should be addressed as outlined below:

1. Passage obstructions (e.g., dams, sediment retention structures, and culverts) are removed or modified to restore access of key populations to historically accessible habitat where necessary to support region-wide recovery goals described in the recovery scenario;
2. Forest management practices continue to be implemented under the Northwest Forest Plan on Federal lands, under the Washington Department of Natural Resources Habitat Conservation Plan for state forest lands, and under Washington State Forest Practices Rules consistent with the Forest and Fish Agreement on private lands;

3. Agricultural practices are implemented to protect riparian areas, floodplains, and stream channels, and to protect water quality from sediment, pesticide, herbicide, and fertilizer runoff;
4. Urban and rural development, including land use conversion from agriculture and forest land to urban areas, does not reduce water quality or impair natural stream conditions;
5. The effects of toxic contaminants on salmonid fitness and survival in the Columbia River estuary, lower mainstem, and nearshore ocean are sufficiently limited so as not to affect recovery;
6. Flow conditions that support adequate salmon and steelhead rearing, spawning, and migration are achieved through management of the Columbia River and tributary hydropower systems, and through the development of water withdrawal budgets for irrigation or other consumptive purposes;
7. Channel function, including vegetated riparian areas, canopy cover, stream-bank stability, off-channel and side-channel habitats, natural substrate and sediment processes, and channel complexity is restored to provide adequate rearing and spawning habitat;
8. Dredging or related activities in the Columbia River estuary and lower mainstem are sufficiently mitigated;
9. Floodplain function and the availability of floodplain habitats for salmon and steelhead is restored, including tidal swamp and marsh habitat in the estuary and the tidal freshwater portion of the lower Columbia River. This restoration should include connectedness between river and floodplain and the restoration of impaired sediment delivery processes and conditions affecting the Columbia River estuary and lower mainstem.

(For additional information on current threats resulting from habitat degradation and loss, see the Plan, Volume I, Chapter 3; Volume II, individual subbasin chapters; and Volume III, Appendix E, Chapter 8, “Anadromous Fish Barrier Assessment”.)

#### **4.3.2.2 Factor B: Overutilization for commercial, recreational, or educational purposes**

Harvest mortality for salmon and steelhead occurs in various commercial, tribal, and recreational ocean and freshwater (Columbia mainstem and tributary) fisheries. Total fishery mortality includes both catch and non-catch mortalities (e.g., release mortality from mark-selective and size-selective fisheries and from poaching).

To determine that any one of the three ESUs is recovered, any utilization for commercial, recreational, scientific, or educational purposes that threatens its continued existence should be addressed as outlined below:

1. Fishery management plans for salmon and steelhead ESUs must be in place that take into account total fishery mortality (i.e., both landed catch and non-landed mortalities) and constrain those rates to levels that are sustainable by the natural populations relied upon for recovery of the listed ESUs;
2. Fishery rules and regulations must be effectively enforced.

(For additional information on current threats resulting from harvest, see the Plan, Volume I, Chapter 3).

#### **4.3.2.3 Factor C: Disease or predation**

Substantial numbers of salmon and steelhead are lost to fish, bird, and marine mammal predators during migration through the mainstem Columbia River. While this predation is a natural element of the ecosystem, it has been exacerbated by anthropogenic habitat changes. Disease results in significant post-release mortality among hatchery fish. Increasing fish abundance through the release of large numbers of hatchery fish could also trigger outbreaks of pathogens in natural fish.

To determine that any one of the three ESUs is recovered, any disease or predation that threatens its continued existence should be addressed as outlined below:

1. Hatchery operations do not subject salmon and steelhead populations to deleterious diseases and parasites and do not result in increased predation rates of wild fish;
2. Predation by avian predators, such as Caspian terns, is managed in a way that promotes recovery of salmon and steelhead populations;
3. Suitable methods and levels of marine mammal control are identified and implemented to mitigate negative interactions with salmon and steelhead where predation poses significant risks to recovery.
4. The northern pike minnow fishery is managed to reduce predation on salmon and steelhead as appropriate to meet recovery goals;
5. Populations of introduced gamefish are managed such that competition or predation with salmon does not impede salmon and steelhead recovery.

(For additional information on current threats resulting from disease or predation, see the Plan, Volume I, Chapter 3, and Volume II, individual subbasin chapters.)

#### **4.3.2.4 Factor D: The inadequacy of existing regulatory mechanisms**

To determine that any one of the three ESUs is recovered, any inadequacy of existing regulatory mechanisms that threatens its continued existence should be addressed as outlined below:

1. Habitat conditions and watershed functions are protected through land-use planning that guides population growth and development;
2. Habitat conditions and watershed function are protected through regulations that govern resource extraction such as timber harvest and gravel mining;
3. Habitat conditions and watershed functions are protected through land acquisition or easements as appropriate where existing policy or regulations does not provide adequate protection;
4. Adequate resources, priorities, regulatory frameworks, and coordination mechanisms are established and/or maintained for effective enforcement of land and water use regulations that protect and restore habitats and for the effective management of fisheries;
5. Regulatory, control, and education measures to prevent additional species invasions are in place.

(For additional information on existing regulatory mechanisms, see the actions summarized in Table 8-1 of the Plan [Volume I, Chapter 8, p. 8-25]; the evaluations of existing programs identified in Volume II, individual subbasin chapters; and Volume III, Appendix C, "Program Directory".)

#### **4.3.2.5 Factor E: Other natural or man-made factors affecting continued existence**

To determine that any one of the three ESUs is recovered, other natural and man-made threats to its continued existence should be addressed as outlined below:

1. Hatchery programs are consistent with region-wide recovery and appropriate criteria are used for the integration of hatchery and natural populations;
2. Hatcheries operate using appropriate risk containment measures for (1) hatchery origin adults returning to natural spawning areas, (2) release of hatchery juveniles, (3) handling of natural origin adults at hatchery facilities, (4) water quality and effective disease control, and (5) harvest of surplus production by employing appropriate marking and other selective harvest strategies (e.g., release locations);
3. Intentional introductions of aquatic species and importation of high-risk species is eliminated. Mechanisms are in place to reduce the impacts of introduced, invasive, or exotic species;
4. Negative impacts of American shad on salmon and steelhead recovery are identified and management measures for those impacts are implemented as appropriate;
5. Nutrient enrichment programs are evaluated to determine where additional nutrient inputs can provide significant benefits;



6. Ecological functions of salmon and steelhead, including nutrients, are considered in establishing escapement goals.

(For additional information on threats from hatcheries, non-native species, and other ecological interactions, see the Plan, Volume I, Chapter 3, and Volume II, individual sub-basin chapters).

#### **4.4 Implementation of the Plan**

The scale of human activities that limit or threaten salmon and steelhead throughout the Washington lower Columbia region is broad and pervasive. Recovery can be achieved only through the combined and coordinated actions of Federal and state agencies, tribes, and local governments, and with the participation of nonprofit organizations, the business sector, and citizens. Collectively, these parties are referred to as implementing partners. The Plan provides specific actions needed to address all threats and identifies the partners with the authority, jurisdiction, or resources needed to implement each action (see Table 8-1 of the Plan, in Volume I, Chapter 8, p. 8-25). These actions represent activities with the greatest potential for protecting and recovering salmon and steelhead. Implementation of recovery actions will not be a one-time or short-term initiative. Programs and actions will likely need to be sustained, evaluated, adjusted, and augmented over the recovery period.

Adaptive management is critical to the implementation and ultimate success of the Plan. Existing information is too uncertain to definitively identify a mix of actions that will ensure recovery of salmon and steelhead. The adaptive management approach includes a framework by which the Plan will develop and evolve, utilizing public input and information acquired through the evaluation of action effectiveness.

Table 8-1 of the Plan (Volume I, Chapter 8, p. 8-25) summarizes the site-specific management actions necessary for the recovery of salmon and steelhead and identifies the implementing partners responsible for those actions. Additional detail on tributary habitat and hatchery actions can be found in the subbasin chapters of volume II of the Plan.

The first major step in the adaptive management program is to obtain 6-year implementation schedules from each of the partners which will describe the tasks, schedules, priorities, and estimated cost to implement the recovery actions. Each of the Federal and state agencies, tribal and local governments, and non-governmental entities identified as partners will be requested to prepare an implementation schedule for their recovery actions. These individual schedules will be combined into a regional implementation schedule which will cover the entire management unit. The initial schedules are expected to be completed in the summer of 2005, and new schedules will be prepared on 6-year intervals, which will coincide with the 6-year adaptive management checkpoints and, along with the 2-year checkpoints, will allow the schedules to incorporate changes or modifications based on effectiveness evaluations.

##### **4.4.1 Site-Specific Management Actions and Priorities**

Table 8-1 of the Plan (Volume I, Chapter 8) provides a summary of site-specific management actions necessary for recovery of salmon and steelhead. Because multiple entities are involved in the implementation of certain actions, some actions appear under more than one entity. In some cases, no single entity has full authority to implement an action, and successful implementation will depend on the coordination and cooperation of a number of agencies. In other cases, while one entity may have lead authority and implementation responsibility, effective implementation will depend on the involvement, support, and agreement of a number of agencies.

According to NMFS' Endangered and Threatened Species Listing and Recovery Priority Guidelines (55 FR 24296), priorities should be assigned as follows to each recovery action:

**Priority 1:** Actions that must be taken to prevent extinction or to prevent the species from declining irreversibly.

**Priority 2:** Actions that must be taken to prevent a significant decline in species population/habitat quality or in some other significant negative impact short of extinction.

**Priority 3:** All other actions necessary to provide for full recovery of the species.

In general, all of the actions described in the Plan are priority 2. Since listing, and before, many actions have been taken to stem the decline of salmon and steelhead, including changes in harvest management, development of passage facilities around dams, and improved forest practices. At this point in the recovery process, all of the recovery actions are intended to reduce threats and result in a positive effect on population status for these ESUs. For these reasons, the recovery actions identified in Table 8-1 of the Plan (Volume I, Chapter 8) are determined to be a priority 2. No actions in addition to actions already implemented (and in some cases ongoing) and acknowledged in the Plan have been identified that are of such importance (i.e., priority 1) that they must be carried out right away or else substantial irreversible harm might occur. Likewise, no priority 3 actions are included, as all of the actions are deemed necessary in the first phase of recovery implementation per the adaptive management, directional approach framework.

To provide a finer scale of prioritization within all the priority 2 actions, as implementing entities develop their 6-year implementation schedules, actions will be further prioritized for implementation within that timeframe. In addition, as monitoring and evaluation data become available, and as subsequent 6-year implementation schedules are developed, priorities will be adjusted. Thus, although all actions are expected to remain priority 2, a finer-scale prioritization within the priority 2 category will provide additional implementation guidance at the local scale.

#### **4.4.2 Estimates of the Time Required and Cost to Carry Out those Measures needed to Achieve the Recovery Goals**

The recovery actions described in the Plan were selected based on their anticipated contribution to the recovery objectives. They are based on biological and technical factors, although consideration was also given to social, cultural, and general economic factors. To establish an estimate of the time required and the cost to carry out these recovery actions, the implementing partners are requested to provide an estimate of the costs associated with the implementation of their recovery actions (i.e., Volume I, Chapter 8, Table 8-1, of the Plan). Partners will also be asked to indicate how they will fund these costs and to identify fiscal constraints that would affect timely or full implementation of their actions.

The Plan also anticipates that additional economic analysis will be incorporated into the adaptive management process over time and will be used to assist in making decisions regarding implementation of the Plan and, where appropriate, to help realign recovery improvement efforts across affected parties and sectors. Appendix D (Volume III) of the Plan explores possible approaches to conducting such an analysis. The specific approach will be developed by the Implementation Steering Committee.

The total cost of recovery is undeterminable at this time. The implementation schedules, however, will contain cost estimates for individual tasks.

Rather than developing estimates of the time required and the cost to carry out Plan measures at this time, NMFS endorses the Plan's approach of calling for development of implementation schedules, including estimates of time and cost to implement actions. NMFS believes that the development of time and cost estimates through this process will be more accurate and effective than any cost estimates and schedules that could be provided now. The implementation schedules will become part of the Plan.

## **5 NMFS' Intended Use of the Plan**

After considering public comment on the Plan, NMFS intends to use the Plan as an interim regional recovery plan and as a major component of the full ESU plan that is eventually developed for these three ESUs. As noted above, NMFS' approach to developing ESA recovery plans is to rely on locally developed plans to the extent possible. In some cases these locally led efforts are organized around geographic areas smaller than an entire ESU (particularly where an ESU is split among one or more states, as is the case with the Lower Columbia ESUs addressed here). In these cases, a plan for one portion of an ESU may be completed before plans for other parts of the ESU are completed. Where this occurs, NMFS wants to acknowledge the local effort and the benefits of implementation of a plan for part of an ESU.

Accordingly, NMFS is using the concepts of management units and interim regional recovery plans. A management unit is a portion of a listed entity that may benefit from different management measures, perhaps due to regional variations in threats or changes in governmental authority. For these three ESUs, NMFS proposes to delineate the portion of these ESUs that occurs within Washington State and within the planning area of the Lower Columbia Fish Recovery Board as the Washington Lower Columbia Management Unit.

NMFS uses the term "interim regional recovery plan" to refer to a recovery plan that is intended to lead to a final recovery plan under the ESA, but is still under development and not yet complete. These plans might lack key components of a final ESA recovery plan, such as the portion of the ESU located in another state, and would only be considered final when the entire ESU is addressed. Once NMFS endorses a plan as an interim regional recovery plan, the plan will serve as NMFS' interim recovery plan. NMFS will continue to work collaboratively with the local entities involved in developing the plans on implementation and on any revisions or updates to the plans.

By endorsing a plan as an interim regional recovery plan, NMFS is committing to implement the actions in the Plan for which we have authority, to work cooperatively on implementation of other actions, and to encourage other Federal agencies to implement plan actions for which they have responsibility and authority. We will also encourage the relevant state government to seek similar implementation commitments from state agencies and local governments.

NMFS believes that Lower Columbia River salmon and steelhead will benefit from immediate implementation of the Plan. The Plan will also be extremely valuable to implementing entities and to the public because of its clear articulation of goals, comprehensive assessment of limiting factors and threats, and identification of actions needed to address those threats. By providing a more thorough and complete compilation of population and watershed information than any previous efforts, the Plan provides a strong technical foundation for its identification of needed recovery actions and for moving forward with action implementation and monitoring and evaluation to track progress toward recovery. For implementing entities and the public, the Plan contains a wealth of information that, combined with the Plan's strong adaptive management focus, will be useful in targeting recovery actions for maximum effectiveness (for example, see the habitat and hatchery assessments provided in the individual subbasin chapters of Volume II of the Plan, and information such as that provided in Volume III, Appendix C, "Program Directory," and Appendix E, Chapter 8, "Anadromous Fish Barrier Assessment").

NMFS supports the Plan and implementation of all the actions in this Plan with the qualifications and clarifications noted below.

1. The Plan includes an action to “Establish an annual allocation of water within the water budget for the Columbia River Basin that simulates peak seasonal discharge, increases the variability of flows during salmonid emigration, and restores tidal channel complexity in the estuary” (Volume I, Chapter 8, p. 8-57).

This action would result in higher flows during the spring and early summer. It is not currently achievable within existing water management constraints and is not consistent with the 2004 Federal Columbia River Power System (FCRPS) biological opinion, which addresses FCRPS operations through the year 2014. In addition, because of the tradeoffs inherent in flow management for the lower river, this recommendation may conflict with recovery needs for upriver ESUs as well as with other authorized purposes of the FCRPS. NMFS will, however, give consideration, to the extent practicable, to the outcomes sought by the Plan in its Columbia River mainstem water management recommendations.

2. Among the harvest measures in the Plan is a measure to “Revise or adjust ESA Fishery Management Plans for lower Columbia ESUs as needed to support the lower Columbia recovery goals and priorities” (Volume I, Chapter 6, p. 6-35).

NMFS supports the Plan’s general approach to harvest. From the text of this particular action, however, it appears that the Plan contemplates that NMFS will revise its ESA Section 7 jeopardy standards (ESA exploitation rate limits) to be consistent with the harvest objectives set forth in the Plan. NMFS’ jeopardy standards for harvest derive from Section 7 consultations on various fisheries proposed by harvest managers and involving a Federal nexus. As such, their purpose is primarily avoidance of jeopardy from harvest. Future ESA consultations, however, will be informed by any pertinent new information developed for and presented in the Plan. NMFS will also work with harvest managers to seek consistency and responsiveness between the recovery scenario in the Plan and harvest actions so that harvest management supports recovery goals. In addition, NMFS will use its authorities under ESA Section 7(a)(1) and the Magnuson-Stevens Act to promote recovery in fishery management.

3. The Plan contains an action for NMFS to “Utilize the Lower Columbia Fish Recovery Plan as a basis for enforcement actions” (Volume I, Chapter 8, p. 8-51). Recovery plans are advisory documents and not enforceable. The Plan and the recovery goals may provide context for evaluation of effects in a manner that could be useful in an enforcement context.

4. The Plan contains an action for NMFS to “Utilize the Lower Columbia Fish Recovery Plan as a basis for its Section 7 consultations and its Section 4 and 10 permits” (Volume I, Chapter 8, p. 8-53).

NMFS expects the Plan will help NMFS and other Federal agencies take a more consistent approach to future consultations. For example, the Plan will provide greater biological context for the effects that a proposed Section 7 consultation may have on listed ESUs. This context will be enhanced by adding recovery plan science to “the best available information” available for Section 7 consultations. Such information includes viability criteria for ESUs and their independent populations; better descriptions of limiting factors and threats facing the ESUs; better geographic context of where limiting factors are a priority to address; and better geographic context of where the ESUs can tolerate different levels of risk.

NMFS expects to update its Section 7 consultation templates to ensure that the technical information, risk considerations and sense of priorities from recovery plans are addressed in future Section 7 consultations and Federal agencies should include conservation recommendations in their consultations that are consistent with implementing the interim plan.

NMFS assumes that the terms and conditions and survival rates from completed consultations and HCPs provide “a baseline” for existing survival rates. NMFS also intends to work with the Federal agencies to ensure that any conservation recommendations that are part of existing Section 7 consultations are

incorporated into recovery plans as recovery actions. NMFS will not require that completed Section 7 consultations or HCPs be re-opened as a result of this interim plan.

Based on the Plan, Federal agencies should anticipate that improvements in survival through all life stages are needed to recover listed ESUs and that this could mean survival improvements beyond what is provided in existing Section 7 consultations. The agencies should work in coordination with the LCFRB to identify practicable opportunities for improving survival beyond that anticipated with the present suite of Section 7 terms and conditions.

5. NMFS agrees with the Plan's approach to artificial propagation. The Plan proposes to modify hatchery programs to support integrated, comprehensive protection and restoration of depleted populations while minimizing impacts to wild fish and also providing fish for harvest. The Plan supports the development of Hatchery and Genetics Management Plans (HGMPs) that describe needed changes and modifications in hatchery programs. The Plan also identifies (in the subbasin chapters of Volume II) specific modifications to hatchery programs and proposals for new programs. NMFS has not yet reviewed all these specific proposals in detail and anticipates working with the LCFRB and the Washington Department of Fish and Wildlife to further explore and evaluate the specific proposals prior to formal decisions.

6. It is important to reiterate the clarification that precedes Table 8-1 of Plan actions in Volume I, Chapter 8, Section 8.9 (see Volume I, p. 8-24). The table organizes by entity the Plan actions for which that entity would be involved in implementation. Because multiple entities are involved in the implementation of certain actions, some actions appear under more than one entity. In some cases, no single entity has full authority to implement an action, and successful implementation will depend on the coordination and cooperation of a number of agencies. In other cases, while one entity may have lead authority and implementation responsibility, effective implementation will depend on the involvement, support, and agreement of a number of entities. In the process of developing 6-year implementation schedules for Plan actions, lead entities will be identified where appropriate for each action.

7. NMFS expects that in response to comments received on the Plan and through the adaptive management process, additional Plan actions, or clarifications of existing actions, may be incorporated over time.

## **6 List of Abbreviations and References**

### **Abbreviations**

Council	Northwest Power and Conservation Council
ESA	Endangered Species Act
ESU	Evolutionarily Significant Unit
LCFRB	Lower Columbia Fish Recovery Board
NMFS	National Marine Fisheries Service
TRT	Technical Recovery Team
USFWS	U.S. Fish and Wildlife Service
VSP	Viable Salmonid Population

### **References**

For a list of references, see Volume I, Chapter 10, of the Plan.